REMR Material Data Sheet CM-LA-1.1

Latex Admixture for Portland-Cement Concrete and Mortar: Polyvinyl NeoCryl A-1055

1. NAME

Polyvinyl NeoCryl A-1055
Latex Admixture

2. MANUFACTURER

Polyvinyl Chemical Industries
730 Main St
Wilmington, MA 01887
Tel 617-658-6600

3. DESCRIPTION

Emulsion of acrylic polymers in water.

4. USES & LIMITATIONS

Uses: Designed as a latex admixture for portland-cement concrete and mortar, Polyvinyl NeoCryl A-1055 can be used in mixtures for patching, overlaying, and repairing concrete and related materials. Repairs and patches may be for spalls, dormant cracks, honeycombs, and other such unsound concrete and related materials. The mixture may be used to resurface floors, overlay bridge decks, etc. Concrete and mortar made with it show good adhesion to concrete, masonry, brick, wood, and steel. This admixture also improves flexural, tensile, and permeability properties.

Limitations: Latex-modified concrete or mortar should not be placed at temperatures below 45°F (7°C). When placing at 45°F, the temperature should be rising. Placements at temperatures below 55°F will require longer curing times. The latex admixture should be kept from freezing.

5. MANUFACTURER'S TECHNICAL DATA

Packaging: 1- and 5-gal pails and 55-gal drums

Shelf Life: Not listed

Physical Properties:

Solids content, % by wt	47
pH at 25°C	9.0
Surface tension, dynes/cm	42
Brookfield viscosity, cps	30
MFT, °C	12

Mixture Proportioning: Polyvinyl NeoCryl A-1055 should be added to the mortar mixture as a partial replacement for water. It can be used at levels of up to 20% polymer solids based on the dry weight of the portland cement. A typical initial proportioning for a latex-modified cement mortar mixture is as follows:

	lb
Sand	280.0
Portland cement, Type I	94.0 (1 bag)
NeoCryl A-1055 (47%)	30.0
Nopco NXZ*, antifoam	0.2
Water	18.0

Time of set (ASTM C 191-71)

Initial set	7 hr 55 min
Final set	9 hr 40 min

* Diamond Shamrock, Industrial Chemicals Division, Morristown, NJ.

5. MANUFACTURER'S TECHNICAL DATA (Continued)

Mixture Proportioning (Continued): This mixture proportion provides 15% polymer solids based on the portland cement weight.

Typical Strength Improvements: Latex-modified mortar made with Polyvinyl Neocryl A-1055 shows the following improvement in physical properties over conventional sand-cement mortar:

	Property Improvement
Compressive strength	2.0 X
Tensile strength	2.5 X
Flexural strength	3.0 X
Impact strength	2.5 X
Abrasion resistance	20 X
Shear bond adhesion	14 X
Brick bond strength	5 X

6. MANUFACTURER'S GUIDANCE FOR APPLICATION

Surface Preparation:

Steel--Surface should be prepared by mechanical means such as sand-blasting to remove all rust and mill scale. Material should be applied as quickly as practical after completion of surface preparation.

Concrete and other substrates--Surface should be prepared by mechanical means such as sandblasting to remove all deteriorated material to sound substrate. Surface may be damp, but hydrostatic pressure should not be coming through the substrate to be repaired or resurfaced.

Mixing: The general procedure for preparing Polyvinyl NeoCryl A-1055 modified mortar begins with thorough premixing of the sand and cement. Polyvinyl NeoCryl A-1055, defoamer, and most of the water are blended together and added to the premixed sand and cement. (To avoid overly fluid compositions, a portion of the water should be withheld and added gradually to the modified mortar mixture until the desired consistency is obtained.) The entire composition is mixed thoroughly for about 2 to 4 min.

Although mixing procedures generally remain the same, the proportioning varies according to the performance needs of the application. These proportions can vary in both type and quantity of materials used. While numerous component relationships exist, some key proportioning concepts are:

Choice of filler--The type and particle size distribution of fillers are selected for reasons which include cost, density, desired color and texture of the final product, leveling characteristics, and workability.

Sand (filler) to cement ratio--For a typical latex-modified mortar application, a 3:1 sand-cement ratio provides excellent mechanical strength properties. However, different ratios of filler to cement may be appropriate for applications with different performance requirements.

Level of polymer modification--Laboratory tests indicate that an optimum balance of latex-modified mortar properties (adhesion, tensile strength, flexural strength, compressive strength, impact resistance, water resistance, and abrasion resistance) is obtained by incorporation of 10 to 20% polymer solids, by weight of cement. Higher percentages of polymer solids will enhance a more limited set of properties; e.g., flexibility and water resistance. Lower percentages will reduce the benefits of the polymer modification.

Use of defoamer--Exhaustive research has shown that most cement strength properties vary directly with the density of the mortar; the higher

the density, the better the performance. Thus, when modifying cement mortars with a polymer emulsion, it is important to minimize the air entrainment which results from foaming. By using the appropriate amount of commercially available defoamer, it is possible to achieve high-density polymer-modified mortars with excellent strength properties. In general, the wet density of the latex-modified mortar should be very close to that of an unmodified mortar. In most cases, the wet density will be 2.0 g/cc or higher.

Level of water--Maximum density and strength are obtained when a minimum amount of water is used. This minimum water requirement refers to the lowest water-cement ratio which provides adequate workability.

Selected initial mixture proportions are presented below. Because the surfaces to which the material is to be applied, raw materials (i.e., sand and cement), and application conditions vary widely, it is strongly recommended that trial applications be made to evaluate performance. Specific changes in mixture proportions can then be considered to achieve the best field results.

Patching and Repair Mortar
(Suggested Mixture Proportions)

Material	Parts by Wt	Notes
Sand (45 mesh)	300.0	
Portland cement (Type I)	100.0	
NeoCryl A-1055 (47% solids)	21.0	10% polymer solids based on cement wt
Defoamer	0.1	Suggested minimum of 1%, based on polymer solids, using 100% active defoamer
Water	*	Withhold a portion and add gradually to obtain desired consistency

* To proper consistency.

Resurfacing and Underlayment Mortar
(Suggested Mixture Properties)

Material	Parts by Wt	Notes
Sand (80 mesh)	100.0	
Silica flour No. 120	50.0	Finely divided silica filler
Portland cement (Type I)	100.0	
NeoCryl A-1005	21.0	10% polymer solids based on cement wt
Defoamer	0.1	Suggested minimum of 1%, based on polymer solids, using 100% active defoamer
Water	*	

* To proper consistency.

Safe Handling Information: Toxicity testing on Polyvinyl NeoCryl A-1055 emulsions have not shown it to be hazardous via single acute oral, dermal, or inhalation exposure. It may be a slight skin irritant. This

irritation may result from its alkalinity and should be treated accordingly.

7. CORPS OF ENGINEERS' EVALUATION

Mixture Proportioning Data:

Mixture No. 1

Material	Percent by Mass
Sand (ASTM C 109)	66.9
Portland cement (Type I)	22.3
Polymer (1:1)*	10.8
Antifoam B silicone emulsion**	0.055

NOTE: Polyvinyl NeoCryl A-1055 total solids tested to be about 47%. A water-cement ratio of 0.37 was used and no account was made for the water absorption of the sand. The polymer-to-cement ratio was 0.114. Sand and cement were blended for 1 min. The latex, defoamer, and water were then added to the sand and cement. All materials were mixed for 1 min. The sides and bottom of the mixing container were scraped so that all materials were completely mixed. The mixture was then blended for another minute. Specimens were cast in accordance with ASTM procedures.

* 1 part NeoCryl A-1055 (47% solids) to 1 part water by volume.

** Dow-Corning Corporation.

Mixture No. 2

Material	Percent by Mass
Sand (ASTM C 109)	67.7
Portland cement (Type I)	22.6

(Continued)

Mixture No. 2 (Continued)

Material	Percent by Mass
Polymer (1:3)	8.7
Antifoam B silicone emulsion	0.05

NOTE: The water-cement ratio was 0.38 for the latex-modified mortar. The Polyvinyl NeoCryl A-1055 was diluted: 1 part latex to 3 parts water by volume. Polymer content of the Neocryl A-1055 as received was 47%, and the polymer-to-cement ratio for Mixture No. 2 was 0.051. Mixing and placing procedures were the same as for Mixture No. 1.

Control Concrete Mortar

Material	Percent by Mass
Sand (ASTM C 109)	67.0
Portland cement (Type I)	22.3
Water	10.6

NOTE: The water-cement ratio was 0.475, as the water absorption of the sand was not used. Mixing and placing procedures were the same as for Mixture No. 1.

Mechanical Data:

	Mixture		
	No. 1	No. 2	Control
Compressive Str, ASTM C 39, psi	5260	5560	5880
Flexural Str, ASTM C 348, psi	1550	1160	970
Bond Test, Arizona Slant Shear, ASTM C 882, psi	2580	2830	--

The latex-modified mortar specimens were cured 28 days at 73°F (23°C) and 50% relative humidity, and the control specimens were cured in the moisture cure room (73°F and 100% relative humidity) for 28 days.

8. SUPPLEMENT TO MANUFACTURER'S GUIDANCE FOR APPLICATION

Application:

To ensure the best bond between the latex-modified mortar and the surface to be repaired, it is recommended that a latex-cement slurry be used to prime the repair area. The slurry should be made by mixing 2 parts cement to 1 part latex solution. The slurry coat is then scrubbed into the repair area making sure to wet all pores. After the slurry has been scrubbed into the area to be repaired, the latex-modified mortar should be applied while the slurry is still damp. If the area to be repaired is large, coat only as much of the area as can be completed before the slurry coat dries.

After an area has been slurry coated and the latex-modified mortar has been thoroughly mixed, the mortar should be placed without delay. The mortar should be worked into the bottom and sides of the repair area. It should then be filled, tamped, screeded, and finished to match the elevation of the existing concrete. Best results may be obtained by merely leveling the repair with a wood or metal screed. Additional troweling around the side of the repair may help achieve maximum bonding strength. Remember that before the mortar begins to skin over the finish must be completed.

Curing: For hot and windy weather, damp burlap should be placed over the repair for the first 24 hr. Then the repair should be air cured for 7 to 14 days before placing the repair area back into service. If the repair is made under cool and moist conditions, no special cure is needed. (It should air cure 7 to 14 days before the repair area is placed back into service.)

9. ENVIRONMENTAL CONSIDERATIONS

Reasonable caution should guide the preparation, repair, and cleanup phases of concrete or mortar repair activities involving potentially hazardous and toxic chemical substances. Manufacturer's recommendations to protect occupational health and environmental quality should be carefully followed. Material safety data sheets should be obtained from the manufacturers of such materials. In cases where the effects of a chemical substance on occupational health or environmental quality are unknown, chemical substances should be treated as potentially hazardous toxic materials.

10. AVAILABILITY & COST

Availability: This material is available throughout the US through a network of local distributors.

Cost: FOB $371.25 for a 55-gal drum.